

Amendments to the Specification:

Please replace page 11 lines 6-21 with the following amended lines:

The base station 218 is based upon a general purpose programmable hardware device such as a gate array configured to function as a functionally equivalent "virtual microcontroller" 220. This is accomplished using an associated integral memory 222 which stores program instructions, data, and other associated information. Base station 218 comprises of file register 221, SRAM 225, CPU 234 and program counter 233. The base station 218 is configured as an emulator of the internal microprocessor portion of the microcontroller 232. In preferred embodiments, a field programmable gate array FPGA (or other programmable logic device) is configured to function as the virtual microcontroller 220. The FPGA and virtual microcontroller 220 will be referred to interchangeably herein. The base station 218 further includes a trace buffer 241, which stores trace path of the code. The pod, in certain embodiments, provides connection to the microcontroller 232 that permits external probing as well as interconnection with other circuitry as might be used to simulate a system under development. ~~Microcontroller 232 further comprises memory 240, SRAM 233, and CPU 234.~~

Please replace page 14 line 11 to page 15 line 20 with the following amended lines:

For example a consistency check may be conducted when the execution of the debugging operation is halted. The consistency check comprises: comparing a content of SRAM 225 and a content of SRAM 237, and comparing a content of CPU registers 234 and a content of CPU registers 238. The software in host device 210 reads back the content of SRAM 225 and the content of SRAM 237 into memory 222. The software program residing in host device 210 compares the contents the two SRAMs to verify the consistency. If the contents of the two SRAMs are not consistent the software in the host device 210 issues a signal indicating a "lock-step error". Similarly, the software in the host device 210 may compare a content of ICE CPU registers 238 and a content of production microcontroller CPU registers 234, for consistency verification. In a similar manner the software in host device 210 reads back a content of CPU 238 and a content of CPU 234 into memory 222. The software program residing in host device 210 compares the contents the two CPU and signals "lock-step error" if the contents of the two CPUs are not matching.

When a lock-step signal is detected, the user checks the trace buffers 241. The trace buffer 241, residing in the base station 218, keeps track of each line of the code executed. Examining trace buffer 241 the user can determines determine which line of code caused the halt. Trace buffer 241 also keeps track of the content of CPU registers on each line of code. The user can back track the execution of each line of code and the associated CPU registers to find the exact

line of code where the content of CPU register 238 and the content of CPU register 234 diverged as a result of a faulty code. Once the code is debugged the debugging process will resume. It is appreciated that CPU register 234 and SRAM 225 in base station 218 and CPU register 238 and SRAM 237 in production microcontroller 232 are initialized with zeros to ensure the integrity of the tracing and the consistency checking.

Similarly, when a break point is encountered, a lock-step consistency check may be conducted. The lock-step operation of the microcontroller 232 and the virtual microcontroller 220 requires the virtual microcontroller 220 and production microcontroller 232 to start running a microcontroller code at the same time, run each line of the microcontroller code at the same time, have the same CPU register content and the same SRAM content on both sides, and to stop at the exactly the same line of code when a breakpoint is encountered. Therefore, at a breakpoint the software in the host device 210 will conduct a consistency check as described above and if there is a mismatch of memory content or SRAM content the host device 210 will issue a "lock-step error".